

CLAIMS:

1. An elongated display fiber (1), comprising an optical fiber body (2) having a plurality of pixel positions distributed along the length of said fiber (1), characterized in that it further comprises: at least one light source (3) arranged to selectively illuminate said fiber (1) with light from at least one end thereof; means operably associated with said fiber for sequential addressing of one of each of said pixel positions; means for selectively causing said fiber (1) to emit said light at said addressed one of said pixel positions.
2. The elongated display fiber (1) of claim 1, characterized in said fiber (1) being an annular fiber, an electro wetting material (4) being comprised inside of said annular fiber (1) and arranged such that a drop or meniscus thereof can be addressed to be positioned by means of electro wetting at one of said pixel positions, said drop or meniscus being arranged to scatter and couple said light out of said fiber (1) at said addressed pixel position.
3. The elongated display fiber (1) of claim 2, characterized in said annular fiber (1) being filled with two immiscible electro wetting liquids, a first transparent liquid having refractive indices making it a light guide and a second light scattering liquid, said light scattering liquid preferably being a drop of limited length in order to reduce viscous dissipation.
4. The elongated display fiber (1) of any one of claims 2 or 3, characterized in said annular fiber being provided with a patterned conductive transparent outer coating (6) and a phobic inner coating (7), said patterned conductive transparent outer coating (6) being segmented and each segment i being electrically connected to a segment $i+n$, said segment groups being arranged to be charged consecutively by said addressing means for positioning by means of electro wetting said drop or meniscus of said electro wetting material (4) at said one addressed pixel position.
5. The elongated display fiber (1) of claim 1, characterized in said fiber (1) comprising: slightly conical sections (8) distributed along the length of said fiber (1); said

addressing means comprising optical beam steering means arranged to scan minute angels in respect to a centerline of said fiber (1); said means for selectively causing said fiber to emit said light at said one addressed pixel position comprising means for controlling the illumination angle in respect to the centerline of said fiber such that a beam from said at least one light source (3) will be reflected inside said fiber (1) such that it increases its angle of incidence with each reflection until said angle of incidence reaches the Brewster angle and said beam escapes said fiber (1) at said one pixel position addressed through the original angel of incidence in respect to the centerline of said fiber (1).

6. The elongated display fiber (1) of claim 5, characterized in said fiber in order to scatter said escaping beam having a semitransparent cladding (9) provided either through modification of outer surface roughness or addition of a scattering coating.

7. The elongated display fiber (1) of claim 1, characterized in said fiber being a multi-layer fiber consisting of multiple light guiding layers (10) separated by layers (11) with a lower refractive index; said addressing means comprising optical beam steering means arranged to selectively illuminate one of said layers (10); said layers (10) having different lengths corresponding to different ones of said pixel positions for causing said fiber (1) to emit said light at said addressed one of said pixel positions corresponding to said illuminated layer (10).

8. The elongated display fiber (1) of claim 7, characterized in said layers (10) having tapered ends for increasing the light emitting area.

9. The elongated display fiber (1) of any one of claims 7 or 8, characterized in said layers (10) having different lengths at said one fiber end arranged to be illuminated by said at least one light source (3).

10. The elongated display fiber (1) of any one of the preceding claims, characterized in said at least one light source (3) comprising a combination of multiple, preferably three, color, time modulated light sources, such as light emitting diodes (LEDs).

11. A display apparatus (11) characterized in that it further comprises at least one elongated display fiber (1) according to any one of the preceding claims and an associated display driver means (12).
- 5 12. The display apparatus (11) of claim 1 characterized in that it further comprises a plurality of said fibers (1) disposed in a side by side arrangement to define a viewing surface of said display apparatus (11).
- 10 13. The display apparatus (11) of claim 12 characterized in that it further comprises a substrate on which said plurality of fibers (1) are disposed in said side by side arrangement.
- 15 14. The display apparatus (11) of any one of claims 11 to 13 characterized in that it further comprises said plurality of said fibers (1) disposed as an array of essentially parallel fibers (1).
15. The display apparatus (11) of claim 11 characterized in that it further comprises a plurality of said fibers (1) disposed in a warp or weft of a fabric.
- 20 16. The display apparatus (11) of claim 11 characterized in that it further comprises a plurality of said fibers (1) disposed as meandering fibers in a fabric.
17. The display apparatus of any one of claims 15 or 16 characterized in said fabric being a textile.